REMARKS

The rejections under 35 U.S.C. § 103(a) of:

Claims 1, 2, 5-7, 10-11, 15, and 17-18, and 4 and 9, as unpatentable over U.S. 2003/0166735 (Clatty),

Claims 3 and 16, as unpatentable over Clatty and further in view of U.S. 5,405,884 (Londrigan et al),

Claims 4 and 9, as unpatentable over Clatty and further in view of U.S. 6,331,577 (Volkert et al),

Claims 12-14, as unpatentable over Clatty and further in view of U.S. 4,282,331 (Priest), and

Claim 19, as unpatentable over Clatty and further in view of U.S. 2006/0180274 (Burckhardt et al),

are respectfully traversed.

Claim 1 herein is drawn to a **shoe sole** comprising a tin-free polyurethane foam that has a density of from 100 to 800 g/l and is obtained by reacting a) at least one polyisocyanate with b) at least one compound having isocyanate-reactive hydrogen atoms in the presence of as a catalyst, c1) at least one bismuth carboxylate in an amount of from 0.2 to 2% by weight, based on the total weight of the component b) and c2) at least one tertiary amine. (Emphasis added).

Claim 6 is of the same scope but is drawn to a process.

As previously pointed out, Clatty is drawn to a **rigid, closed-cell polyurethane foam**.

In addition, and as previously submitted, Clatty could not have predicted the results disclosed in the specification herein, shown in Example 4 and Comparative Example 4. Comparative Example 4 uses a tin catalyst while Example 4 uses a bismuth catalyst according to the present invention. As shown in Table 1 and Table 2 in the specification

herein, the results are similar. An object of the present invention is to provide systems which can be used for producing polyurethane foams, in particular microcellular polyurethane moldings, which should, without the use of tin catalysts and without use of catalysts comprising transition metals, display a curing behavior which is at least comparable to known systems and display other processing and use properties which are at least comparable and should at the same time have toxicological and economic advantages, as described in the specification at paragraph [0008]. As discussed above with regard to Example 4 and Comparative Example 4, the substitution of organotin by a bismuth carboxylate surprisingly leads to the same or similar mechanical properties as well as to the same or similar curing behavior.

The Examiner finds that the above-emphasized term "shoe sole" is a statement of intended use and not a claim limitation, and is entitled to little patentable weight because the recitation occurs in the preamble.

In reply, it is well-established that whether or not a preamble limits a claim is made on a case-by-case basis in light of the facts in each case; there is no litmus test defining when a preamble limits the scope of a claim. *Catalina Mktg. Int'l v. CoolSavings.com, Inc.*, 289 F.3d 801, 808, 62 USPQ2d, 1781, 1785 (Fed. Cir. 2002). Claim 1 claims a shoe sole, not a tin-free polyurethane foam having use as a shoe sole. The claimed shoe sole necessarily must have a shape of at least a part, if not the whole, of the underside of a foot. Clearly, the preamble **does** "[give] life, meaning and vitality" to the claims as prescribed in *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951).

The Examiner finds that because Clatty is drawn to molded polyurethane products and because shoe soles are a molded product, the rigid, closed-cell polyurethane foam of Clatty "is capable of being used to produce a shoe sole." As support for this finding, the Examiner

notes that Clatty discloses his foams as having a "Shore hardness of at least 40 and preferably of from 50 to 75," relying on the disclosure in Clatty at [0075].

In reply, the Shore hardness disclosed in Clatty is **Shore D** hardness. In the specification herein, Applicants disclose in the specification at page 3, lines 10-13 that the **Shore A** hardness of preferred embodiments of the present invention ranges from 20 to 90 Shore A. While the numerical values for the Shore A hardness described herein and the Shore D hardness described in Clatty may overlap, comparing Shore A and Shore D numbers is like comparing apples to oranges. **Submitted herewith** is a copy of the standard DIN 53505 which describes Shore A and Shore D hardness testing of rubber. The highly flexible material necessary for shoe soles generally has a Shore A hardness of about 50 to 70 and an elongation at break of several hundred percent. In contrast, rigid polyurethanes such as the type disclosed by Clatty have an elongation at break of only several percent, high flexibility values are not required, and the Shore D hardness is usually higher than 50. Shore A and Shore D are measured on different equipment and different forces are used; a specific value for Shore D hardness is much harder than the same numerical value for Shore A hardness.

Nor has the Examiner made any findings on the above-discussed comparative data of record.

In sum, one of ordinary skill in the art would never consider Clatty to address any problem with regard to shoe soles.

The Examiner relies on Londrigan et al for a disclosure of a ratio between an organic acid metal salt catalyst and a tertiary amine in a process for preparing a rigid, closed-cell polyisocyanurate foam (column 5, lines 35-50).

In response to Applicant's argument that Londrigan et al does not disclose a bismuth carboxylate, so that the ratio disclosed therein is irrelevant, that the cation of their organic acid metal salt is an alkali metal and/or alkaline earth metal (column 3, line 49ff), and

therefore, Londrigan et al does not remedy any of the above-discussed deficiencies of Clatty, the Examiner simply states that one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references (citations omitted).

In reply, it is plainly seen that the above-argument by Applicants does **not** attack Clatty and Londrigan et al individually but explains why one of ordinary skill in the art would not have combined them.

The Examiner relies on Volkert et al for disclosing flexible integral polyurethane foams for use in shoe soles (column 1, lines 6-11).

In response to Applicants' argument that Clatty is drawn to rigid foams, and that only with the present disclosure as a guide would one of ordinary skill in the art modify the rigid, closed-cell polyurethane foam of Clatty to be a flexible foam, which would defeat Clatty's purposes, the Examiner states that Volkert et al "is used as teaching reference, and therefore, it is not necessary for the secondary reference to contain all the features of the present invention" (citations omitted), and that the term "flexible" foam and "rigid" foam "are relative terms and one of ordinary skill in the art would know that rigid foams and flexible foams can be used to produce the same end product."

In reply, the terms "rigid" and "flexible" when related to foams, are directed to different, not the same or similar, end products. Indeed, rigid polyurethane foams represent a defined class of materials that is usually used for insulation purposes, due to its relatively high hardness, and very low thermal conductivity, since the closed cells prevent air flow.

Priest is relied on for a disclosure of the use of graft polyols as an isocyanate-reactive hydrogen atom-containing compound for preparing polyurethane foams. Burckhardt et al has been relied on for a disclosure of a bismuth catalyst in a carboxylic acid used to catalyze a polyurethane, such as bismuth tri(neodecanoate) in neodecanoic acid. However, neither Priest nor Burckhardt et al remedy the above-discussed fundamental deficiencies in Clatty.

For all the above reasons, it is respectfully requested that the rejections be withdrawn.

All of the presently-pending claims in this application are now believed to be in immediate condition for allowance. The Examiner is respectfully requested to pass this application to issue.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.
Norman F. Oblon

Harris A. Pitlick
Registration No. 38,779

Customer Number
22850

Tel: (703) 413-3000
Fax: (703) 413 -2220
(OSMMN 08/07)

Shore A and Shore D hardness testing of rubber

DIN 53505

ICS 83.060

Prüfung von Kautschuk und Elastomeren – Härteprüfung nach Shore A und Shore D

This standard, together with DIN EN ISO 868, January 1998 edition, supersedes June 1987 edition.

In keeping with current practice in standards published by the International Organization for Standardization (ISO), a comma has been used throughout as the decimal marker.

Foreword

This standard has been prepared by Technical Committee *Prüfung der physikalischen Eigenschaften von Kautschuk und Elastomeren* of the *Normenausschuss Materialprüfung* (Materials Testing Standards Committee). It conforms largely with DIN EN ISO 868 and ISO 7619 : 1997.

The precision data given here were obtained in a 1985 interlaboratory test in which 14 laboratories participated. Test pieces of three qualities of rubber were prepared in a central laboratory, and then each laboratory tested five test pieces of each rubber quality over four successive days. Each test comprised three measurements, the median of which was given to the nearest Shore unit. The results are shown in table 3.

It was shown that a shorter reading interval of one second and the use of a hand-held instrument had no influence on the precision data. However, the level of the test (cf. table 3) was influenced by the measurement procedure itself, particularly in the lower hardness range (around 40 Shore A). Here, an increase by 0,8 units was observed for a reading time of one second, and an increase by 1,2 units occurred where a hand-held instrument was used. Repeatability and reproducibility can therefore only be ensured if the test parameters specified in this standard (a reading interval of three seconds and the use of a stand) are maintained.

Amendments

This standard differs from the June 1987 edition in that it no longer deals with plastics, as these are covered in DIN EN ISO 868, and references have been updated.

Previous editions

DIN 53503-2: 1943-03; DIN 53503: 1948-08; DIN 53505: 1953-09, 1957-06, 1960-05, 1967-04, 1973-03, 1973-08, 1987-06.

1 Scope

This standard specifies the hardness testing of rubber test pieces and products. The hardness of a rubber is determined by its viscoelastic properties, particularly the elastic modulus as determined in DIN 53504. Type A durometers are suitable for testing in the hardness range from 10 to 90 Shore A, while type D durometers are to be used in the high hardness range.

The ball indentation method can be used for the middle hardness range, either using a 2,5 mm diameter ball as specified in DIN 53519-1 or – for softer test pieces – with a 5 mm diameter ball as specified in DIN EN ISO 2039-1. Test pieces which are too small to be tested as in DIN 53519-1 may be tested in accordance with DIN 53519-2.

An overview of the ranges of application for the different hardness testing methods is given in Appendix A.

Continued on pages 2 to 5.

Translation by DIN-Sprachendienst.

In case of doubt, the German-language original should be consulted as the authoritative text.

2 Normative references

This standard incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the titles of the publications are listed below. For dated references, subsequent amendments to or revisions of any of these publications apply to this standard only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

DIN 51220	General requirements for materials testing machines, including verification and calibration
DIN 53504	Determination of tensile stress/strain properties of rubber
DIN 53519-1	Determination of indentation hardness (IRHD) of soft rubber using standard specimens
DIN 53519-2	Determination of indentation hardness (IRHD) of soft rubber using small specimens
DIN 53541	Determination of crystallization effects by measuring the hardness of rubber
DIN 53545	Determination of low-temperature behaviour of rubber – Principles and test methods
DIN 53598-1	Statistical evaluation of random samples with examples from tests on elastomers and plastics
DIN EN ISO 868	Plastics and ebonite – Determination of indentation hardness by means of a durometer (Shore hardness) (ISO 868 : 1985)
DIN EN ISO 2039-1	Plastics – Determination of hardness – Part 1: Ball indentation method (ISO 2039-1 : 1993)
ISO 5725-1 : 1994	Accuracy (trueness and precision) of measurement methods and results – Part 1: General principles and definitions
ISO 7619 : 1997	Rubber – Determination of indentation hardness by means of pocket hardness meters

3 Concepts

Shore hardness

The resistance to indentation by a body of defined shape and under a specified load.

The Shore hardness scale ranges from 0 to 100, with 0 being the lowest and 100 the highest value.

4 Designation

Designation of the method of testing the hardness of rubber using a type A durometer:

Test DIN 53505 – A

Designation of the method of testing the hardness of rubber using a type D durometer:

Test DIN 53505 – D

5 Apparatus

5.1 Durometers

Durometers shall meet the following requirements and shall be marked either 'Type A durometer, DIN 53505' or 'Type D durometer, DIN 53505', together with the manufacturer's trademark and serial number.

The scale interval shall correspond to one Shore hardness unit, and the scale spacing shall be at least 1 mm.

The shape and dimensions of the indenter and pressure foot shall be as shown in figure 1.

The loading characteristics shall be determined by applying forces to the indenter by means of weights, and shall comply with the nominal values given in table 1 to the nearest 5 mN.

Instruments shall be capable of measuring to an accuracy of ±1 Shore A or Shore D unit. Instruments used for in-house testing shall be inspected regularly by the user, while those used for conformity assessment (e.g. in acceptance tests or as a basis for certification) shall be verified annually according to DIN 51220 by an accredited test laboratory.

5.2 Durometer stand

The durometer may be placed on a stand to ensure that a load of up to (12,5 ± 0,5) N for type A durometers or (50 ± 0,5) N for type D durometers can be evenly applied to the test piece, and that the pressure foot is parallel to the test piece surface.

Table 1: Loading characteristics for type A and type D durometers

Shore hardness value	Indenter travel, in mm	Force, F, in mN	
		Shore A (± 40)	Shore D (± 200)
0	2,5 ± 0,02	550	0
10	Linear characteristics	1 300	1)
20		2 050	8 900
30		2 805	13 350
40		3 555	17 800
50		4 305	22 250
60		5 060	26 700
70		5 810	31 150
80		6 560	35 600
90		7 310	40 050
100	0	8 065	44 500

1) No value is specified here because the required linearity cannot be achieved in the micro-range (0 to 10 Shore D) since there is no preload for Shore D testing.

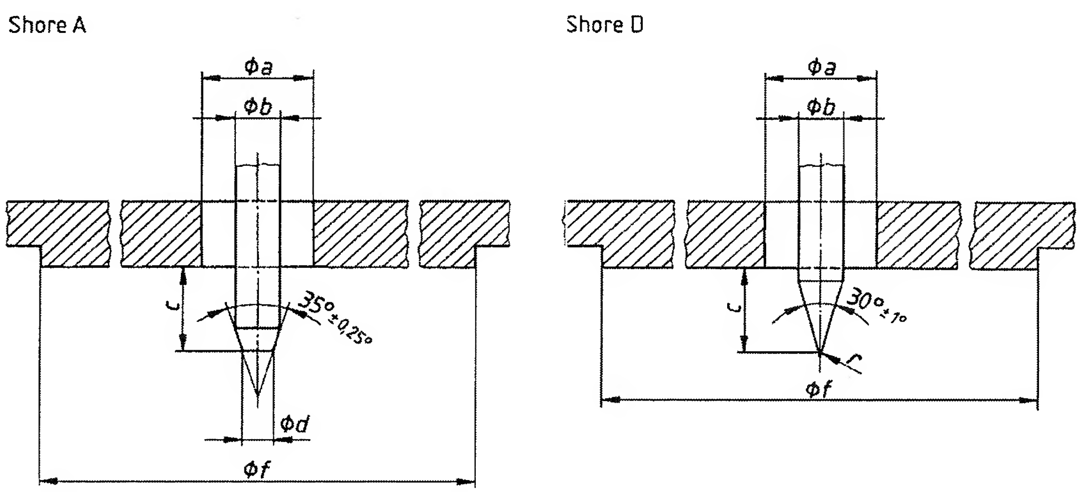

Figure 1: Indenter and pressure foot (notation; see table 2 for dimensions)

Table 2: Indenter and pressure foot dimensions (see figure 1)

a	∅ (3 ± 0,10) mm	Indenter hardened and polished
b	∅ (1,25 ± 0,15) mm	
c	(2,5 ± 0,02) mm	
d	(0,79 ± 0,01) mm	
r	(0,1 ± 0,01) mm (spherical)	
f	∅ (18 ± 0,50) mm	

5.3 Conditioning chamber

If measurements are to be carried out above or below ambient temperature, a chamber may be provided in which the test temperature is maintained and in which measurements are to be carried out. For instance, the test piece, test piece support, indenter and pressure foot may be placed in the chamber, while the indicating device remains outside at ambient temperature, or the entire apparatus may be conditioned in the chamber.

6 Test pieces

6.1 Shape

Test pieces shall be at least 35 mm in diameter, at least 6 mm thick, and have a smooth, flat surface. Test pieces for Shore A testing shall be lightly dusted with talcum before measurements are performed.

Testing of thin materials may be carried out using stacked test pieces comprised of no more than three layers, each layer being at least 2 mm thick. Care shall be taken that no air is trapped between the layers. The use of stacked test pieces and the number of layers shall be noted in the test report.

Measurements may be made on products of any shape, although in the case of curved products, details are to be given as to the location of the measurement points. Note that results for a product which does not have the dimensions specified above only apply to products having the same shape as that tested, and are not to be deemed material constants.

6.2 Number of test pieces

One test piece shall be tested, unless otherwise specified.

7 Procedure

7.1 Testing shall be carried out on test pieces which have not been subjected to mechanical stress, at a temperature of (23 ± 2) °C, and at least 16 hours after vulcanization. If necessary, other test temperatures may be agreed upon, in which case the test piece temperature shall not deviate from the nominal value by more than ± 1 °C. This applies especially to testing at low temperatures.

Prior to testing, condition the test pieces in the chamber at test temperature for at least 30 minutes. For low temperature testing as in DIN 53541 or DIN 53545, the conditioning time shall be agreed.

7.2 On each test piece, measurements shall be made at three or more points spaced at least 5 mm apart and at least 13 mm from the edge of the test piece.

7.3 Place the durometer on the test piece, without shock, so that the pressure foot is in firm contact with the test piece. If a stand as in subclause 5.2 is not used (e.g. due to the shape of the test piece), the durometer may be held by hand, although this will increase the uncertainty of measurement, as will the failure to keep the pressure foot parallel to the test piece surface.

7.4 Once the pressure foot comes in contact with the test piece, wait three seconds and then read off the hardness value. For test pieces with strong flow characteristics, the reading may also be taken after 15 seconds. Note the time interval between application of the pressure foot and the reading.

8 Test report

The test report shall refer to this standard and include the following information:

a) type and designation of the product tested;
b) method by which the product was manufactured;
c) Shore A or Shore D hardness, given as a whole unit, the number of single results, median of results, and span (as in DIN 53598-1);
d) test temperature (where necessary);
e) time interval after which reading was taken (where necessary);
f) any deviations from this standard;
g) date of test.

9 Expression of results

EXAMPLES:

- 75 Shore A hardness (or, 75 Shore A, for short)
- 67 to 69 Shore A at 28 °C and 15 s
- 58 Shore A after 72 h at –30 °C

In technical drawings:
Elastomer, (75 ± 5) Shore A hardness as in DIN 53505

10 Precision

The following applies when evaluating results of Shore hardness testing (see also ISO 5725-1).

The precision data for the range from 40 to 80 Shore A are only slightly dependent on the level. The repeatability limit is 1,7 Shore A and the reproducibility limit is 2,6 Shore A. Since Shore hardness values are given in whole units, these limits are rounded off, giving a repeatability, r, of 2 Shore A and a reproducibility, R, of 3 Shore A.

NOTE: For further calculations, for instance, if several results are to be jointly evaluated, either the exact values (1,7 and 2,6 Shore A) or values taken from table 3 are to be used.

Table 3: Precision data for Shore A hardness testing

Level, m	Repeatability limit			Reproducibility limit		
	s_r^2	r	100 r/m	s_R^2	R	100 R/m
41,4 Shore	0,22	1,33	3,2 %	0,68	2,33	5,6 %
60,1 Shore	0,46	1,92	3,2 %	0,86	2,62	4,4 %
77,7 Shore	0,40	1,79	2,3 %	1,01	2,84	3,7 %
59,7 Shore	0,36	1,70	2,8 %	0,85	2,61	4,4 %

Repeatability

(same operator, same laboratory)

The difference between two single results, obtained under repeatability conditions by one operator over a period of one to four days, will exceed 2 Shore A on average no more than once in twenty cases.

Reproducibility

(different operators, different laboratories)

The difference between two independently measured results, obtained under reproducibility conditions by two observers in different laboratories, will exceed 3 Shore A on average no more than once in twenty cases.

Appendix A

Ranges of application for hardness testing methods

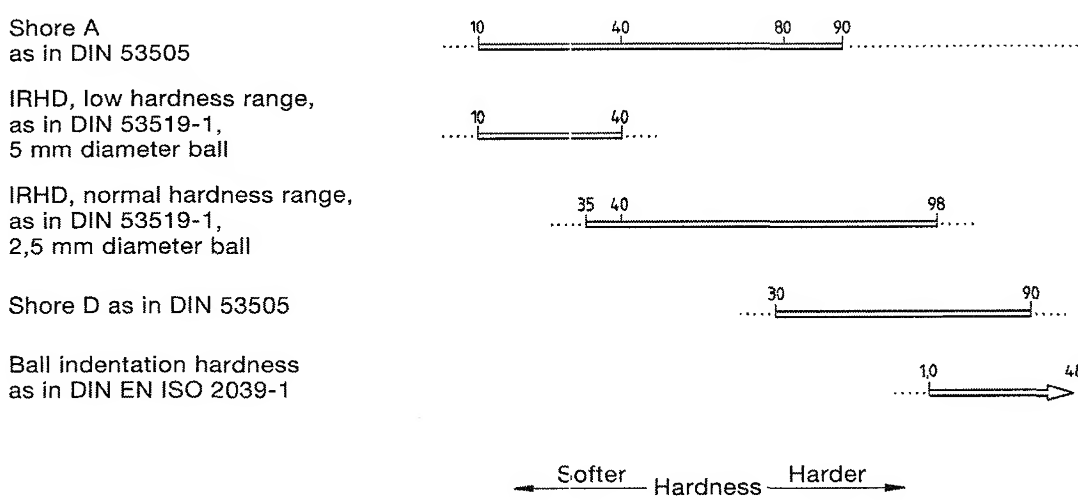

Figure A.1: Ranges of application for different hardness testing methods
(there is no linear correlation between the methods)